

### **AMENDMENTS TO THE CLAIMS**

Please amend claims 11, 15, 25 and 34, and add new claims 35 and 36. Claims 1, 2, 12-14, 16, 18-24 and 26-29 were canceled in previous papers. No new matter is believed to be introduced by the aforementioned amendments and new claims. The following listing of claims will replace all prior versions and listings of claims in the application.

- 1-2.     **(Canceled)**
3.     **(Previously presented)** An x-ray tube comprising:
  - (a) a vacuum enclosure;
  - (b) a filament and a cathode cup including two walls which cooperate to at least partially define a slot wherein the filament is at least partially disposed, a distance between the filament and the at least one wall varying along at least a portion of the longitudinal length of the filament, and the distance between said filament and at least one of the at least two walls being at a minimum proximate a middle portion of the filament; and
  - (c) an anode positioned within the vacuum enclosure so as receive electrons emitted by the filament.
4.     **(Previously presented)** The x-ray tube as recited in Claim 3, wherein the distance between the filament and at least one of the at least two walls is at a maximum proximate at least one end portion of the filament.
5.     **(Previously presented)** The x-ray tube as recited in Claim 3, wherein the at least two walls of the slot are of substantially the same shape and are symmetrically disposed with respect to the filament.
6.     **(Previously presented)** An x-ray tube as defined in Claim 3, wherein the slot further comprises a bottom surface, and wherein the at least two walls are perpendicularly disposed with respect to the bottom surface.
7.     **(Previously Presented)** The x-ray tube as recited in Claim 3, wherein the slot defines a cross-section having a least two different widths.

8. **(Previously Presented)** The x-ray tube as recited in Claim 3, wherein the filament is configured such that at least one of the properties of the filament varies along at least a portion of a longitudinal length of the filament, wherein the properties of the filament are selected from the group consisting of: filament wire diameter, pitch, filament diameter.

9. **(Previously Presented)** The x-ray tube as recited in Claim 3, wherein the slot has a cross sectional area that varies along at least a portion of a length of the slot.

10. **(Previously Presented)** The x-ray tube as recited in claim 3, wherein an emission profile associated with the filament is such that a density of emitted electrons per unit area is substantially uniform throughout a predefined plane through which a substantial portion of the emitted electrons pass.

11. **(Currently Amended)** A cathode assembly suitable for use in an x-ray device, the cathode assembly comprising:

- (a) a base portion;
- (b) a cathode cup attached to the base portion, the cathode cup including at least two walls which cooperate to at least partially define a slot; and
- (c) a filament disposed substantially within the slot, the filament taking one of the following forms:

a ~~helically-wound~~ wire wound into successive coils to form a helix configured such that a diameter of the ~~filament~~ helix varies along a longitudinal axis defined by the filament, the variances in the diameter of the helix being substantially symmetrically arranged with respect to a predetermined location on the longitudinal axis; and

a ~~helically-wound~~ wire ~~whose~~ wound into successive coils to form a helix, where a diameter of the wire varies along a longitudinal axis defined by the filament, the variances in the diameter of the wire being substantially symmetrically arranged with respect to a predetermined location on the longitudinal axis.

12-14. **(Canceled)**

15. **(Currently Amended)** The cathode assembly as recited in claim 11, wherein the slot at ~~least partially defined by the walls of the cathode cup has a cross-sectional area~~ defines a cross-section that varies along at least a portion of a length of the slot.

16. **(Canceled)**

17. **(Previously Presented)** In an x-ray tube having a filament of predetermined longitudinal length, a method for producing an electron stream having a predetermined electron density profile, the method comprising:

- (a) applying a predetermined electric current to the filament so as to cause emission of electrons by the filament;
- (b) varying, with respect to the longitudinal length of the filament, the rate at which electrons are emitted by the filament, the varying of the rate at which electrons are emitted by the filament being implemented by performing one of:
  - varying an electrical field strength in selected areas proximate the filament; and
  - heating the filament in such a way that some portions of the filament are at a relatively higher temperature than other portions of the filament; and
- (c) accelerating at least some of the emitted electrons toward a focal spot located at a predetermined distance from the filament.

18-24. **(Canceled)**

25. **(Currently Amended)** A filament, comprising:

(a) a wire wound into successive coils to form a helix, the helix comprising a middle portion and first and second end portions,

wherein at least one of a group of properties varies along at least a portion of a longitudinal length of the filament, the group of properties ~~consisting of~~ including: wire diameter, wire pitch, and ~~filament diameter~~ coil diameter; and

wherein the wire diameter is ~~greatest~~ greater in the middle portion of the helix than in the first or second end portions; and

(b) first and second electrical leads, the first electrical lead being attached to the first end portion of the helix, and the second electrical lead being attached to the second end portion of the helix.

26-29. **(Canceled)**

30. **(Previously Presented)** The x-ray tube as recited in claim 3, wherein the filament defines a plurality of pitches.

31. **(Previously Presented)** The x-ray tube as recited in claim 3, wherein the slot has first and second ends, the slot being wider at the first end than at the second end.

32. **(Previously Presented)** The x-ray tube as recited in claim 3, wherein the slot has first and second ends, the slot having substantially the same width at the first and second ends.

33. **(Previously Presented)** The cathode assembly as recited in claim 11, wherein the predetermined location comprises a location proximate a center of the filament.

34. **(Currently Amended)** The filament as recited in claim 25, wherein the filament comprises an element of a cathode assembly that includes:

a base portion; and

a cathode cup attached to the base portion, the cathode cup including two walls which cooperate to at least partially define a slot, the filament being at least partially disposed within the slot, ~~and the slot having one of the following configurations:~~

~~the slot having a substantially constant cross-sectional area along a length of the slot; and~~

~~the slot having a cross-sectional area that varies along a portion of the length of the slot.~~

35. **(New)** The filament as recited in claim 34, wherein the slot defined by the cathode cup has a cross-section that is substantially constant along a length of the slot.

36. **(New)** The filament as recited in claim 34, wherein the slot that is defined by the cathode cup has a cross-section that varies along a length of the slot.